

## **PUBLIC ROADS MAGAZINE INDEX –**

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#### **Fifteen Years of HPMS Partnership: Accomplishments and Future Directions**

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INTERCHANGE, which is to be operational by September 1995, will make available to road professionals throughout the world a vast storehouse of technical, managerial, and policy-related information.

### **Metric Conversion — How Soon?**

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The first Truck and Bus Safety Summit in Kansas City, Mo., recently identified the 17 most significant truck and bus safety issues.

### **Bridge Research: Leading the Way to the Future**

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### **Crossing the Delaware!**

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A unique combination of contractor prequalification, design preparation, structural details, and precast concrete segmental construction was used to build the Delaware state Route 1 bridge over the Chesapeake and Delaware Canal.

### **TransGuide Leads the Way in Innovative Transportation Management**

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## **No. 2, Autumn 1995**

### **California's Temporary Freeway Bridge**

*by Nancy McMullin Bobb* ..... 2

When a bridge recently collapsed, Caltrans used an innovative temporary bridge to reopen the route in only eight days.

### **Navigating the Future**

*by James A. Arnold* ..... 4

Navigation and positioning technologies are being revolutionized by the Global Positioning System (GPS). GPS has applications in every area of transportation.

### **Vehicle Compatibility With Roadside Safety Hardware**

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Many issues must be resolved in the development of design and evaluation methodology for roadside safety structures.

### **Advantage I-75 Prepares to Cut Ribbon on Electronic Clearance**

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Advanced technologies allow trucks to have their weight and credentials checked electronically at highway speeds, eliminating the need to stop at multiple weight station along the I-75 corridor.

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The PacRim Conference attracts more than 1,700 participants from more than 50 countries to take “A Ride Into the Future.”

### **TQM: It Really Works!**

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The Federal Lands Highway Office uses total quality management to improve efficiency for six consecutive years.

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American and Japanese engineers cooperate so that they learn from each other’s experiences, and the lessons of the Kobe earthquake in January 1995 have much applicability in the United States.

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The superior safety record of modern roundabouts in Western Europe is attracting attention in the United States.

## **No. 3, Winter 1996**

### **A Revolution in Winter Maintenance**

*by Brian Chollar* ..... 2  
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**New Links to South Africa** ..... 5  
FHWA’s Office of International Programs and the National Highway Institute are actively involved in a cooperative, technology transfer program with the Republic of South Africa’s Department of Transport.

### **Demonstration Project 93 — Making the Most of Today’s Technology**

*by John McCracken* ..... 7  
This project encompasses the joint efforts of 25 U.S. and foreign manufacturers who have formed partnerships with FHWA to promote and demonstrate the latest available technology to state and local jurisdictions.

### **Narrow-Gap Improved Electroslag Welding for Bridges**

*by Krishna K. Verma* ..... 10  
Demonstration Project 102 is designed to transfer a new advanced welding technology to state transportation agencies and bridge fabricators.

### **“Attention Motorists ... The Bats Have Landed on our Bridge!”**

*by Paul Garrett* ..... 12  
Austin, Texas, has adopted the largest urban colony of bats in the world, roosting between the beams of the Congress Avenue Bridge, and publicizes the bats as a tourist attraction.

### **A Living Memorial**

*by Bonny Falk and Bob Bryant* ..... 15  
FHWA has dedicated a memorial marker and grove of 11 Oklahoma redbud trees at the Turner-Fairbank Highway Research Center in homage to the 11 FHWA employees who lost their lives in the April 1995 bombing in Oklahoma City.



**Linking the Delta Region With the Nation and the World** ..... 19  
FHWA is publishing a report about the progress achieved in transportation and employment in the Lower Mississippi River area from 1990 to 1995 and about transportation improvement as a key to continued economic development in the area.

**The National Highway Designation Act of 1995** ..... 29  
On Nov. 28, 1995, President Clinton signed this landmark legislation, which designates 260,000 kilometers of roads as the National Highway System (NHS). NHS is going to be the backbone of our national transportation network.

**The National Highway Institute: A 25-Year Record of Achievement**  
*by Charles Barton*..... 33  
The National Highway Institute, 25 years old in 1995, has become highly esteemed both at home and abroad for its role in technology transfer and as a vital provider of highway technology to the national and international highway communities.

**The CONMAT Initiative: Charting an Innovative Path to the Next Century**  
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In August 1995, 11 different basic construction material (CONMAT) groups formally joined forces to take on the task of creating the high-performance construction materials and systems for a revitalized infrastructure capable of withstanding the demands of the next century.

**Aerodynamic Design of Highway Structures**  
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FHWA is developing improved design and retrofit methods and educating designers in the use of modern methods.

## **No. 4, Spring 1996**

**The National Highway System: A Commitment to America's Future**  
*by Rodney E. Slater* ..... 2  
The National Highway System is the centerpiece of the Federal Highway Administration's commitment to provide a safe, modern, and efficient transportation system to serve the American people, and it is the backbone of our nation's 21st century transportation system.

**Road Tours: Reaching Out to the People**  
*by Evelyn Fierro* ..... 7  
Since April 1994, FHWA leaders have traveled 80,000 kilometers, coast to coast and border to border, to meet with thousands of people who use, construct, maintain, and manage our transportation system.

**The National Highway System Designation Act of 1995**  
*by Nancy Bennett*..... 10  
This article is a summary of the major provisions of the NHS Designation Act, including system designation, safety, motor carrier programs, funding and innovative financing, mandates and requirements, and other provisions.

**Economic Importance of the National Highway System**  
*by Thomas P. Keane* ..... 16  
The signing of the NHS Designation Act released \$5.4 billion in federal-aid highway funds targeted to NHS. In addition, there are direct, indirect, and induced employment and financial benefits.

**The Future FHWA**  
*adapted from several FHWA sources* ..... 21  
FHWA is "building on the past with an eye to the future" by taking a proactive stance to anticipate and meet the nation's burgeoning transportation needs.

## **Technology for Work and Travel**

*by William Zaccagnino*..... 23

FHWA is using available technology to ensure a future with a high-tech transportation network that meets our transportation needs, supports our national defense, provides economic growth, and adds to the quality of life in the United States well into the 21st century.

## **“Find the Good and Praise It”**

*adapted from an FHWA report*..... 30

This article highlights some of FHWA’s significant program accomplishments since June 1993.

## **The Secretary’s Highway Safety Action Plan**

*by Frederick G. Wright Jr.* ..... 37

This plan is a series of actions, some ongoing and some planned for the future, that addresses some of the specific safety issues of the NHS Designation Act and the emerging state responsibilities in the federal-state partnership in highway safety.

## **The National Highway System -- Financing Its Future: The Role of Innovative Finance**

*by Jane F. Garvey*..... 39

Congress — in the National Highway System Designation Act of 1995 — enacted a number of improvements in the way the states and others may finance NHS and other transportation infrastructure. Collectively, these provisions are termed “innovative finance.”

## **Milestones for U.S. Highway Transportation and the Federal Highway Administration**

*compiled by Richard F. Weingroff*..... 44

This is a time line of significant events in the history of highway transportation in America from 1892 to the present.

## **FHWA’s Quality Journey**

*by Fred Jones* ..... 51

Deeply imbedded in the tradition and core values of FHWA is the commitment to provide the highest quality services to our partners and, together with them, to deliver the very best highway transportation system to the nation. NHS is going to provide the future focus for applying quality improvement ideas, practices, approaches, and new technology.

## **A New Face for FHWA in a New Era**

*by David Smith* ..... 53

An effort to broaden and diversify the FHWA work force, particularly in senior management positions, is playing a significant role in ensuring that FHWA efficiently meets its operational requirements and maintains a highly effective and motivated work force.

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#### **Federal Aid Road Act of 1916: Building the Foundation**

*by Richard F. Weingroff* ..... 2

The Federal Aid Road Act of 1916 established the federal-aid highway program that transformed America's roads from alternately dusty and muddy trails to the most advanced and comprehensive road network in the world.

#### **From 1916 to 1939: The Federal-State Partnership at Work**

*by Richard F. Weingroff* ..... 7

The period following World War I and through the 1920s was a golden age for road building, and although the federal-aid highway program felt the impact of the Great Depression in the 1930s, it was during this decade that the master plan for a system of interregional highways was developed.

#### **Federal-Aid Highway Act of 1956: Creating the Interstate System**

*by Richard F. Weingroff* ..... 10

This article explains the development of the interstate network from the initial master plan of 1939 to the 1956 act

that created the National System of Interstate and Defense Highways.

### **Three States Claim First Interstate Highway**

*by Richard F. Weingroff* ..... 18

Whether Missouri, Kansas, or Pennsylvania should be credited with the first interstate highway depends on how “first” is defined.

### **Poetry of the Open Road**

*by Tamara Broberg*

Poets have long recognized the parallels between roads and life and have used roads in both the literal and metaphorical senses to express their insights to our culture.

### **Artists Look at Roads**

*by Richard F. Weingroff* ..... 22

Art, as well as movies and poetry, is another form of cultural expression that “captures” the omnipresence of roads in our surroundings.

### **Local Government Highway Finance Trends, 1984-1993**

*by Leonard S. Goldberg* ..... 24

This article gives a brief historical overview of local government highway finance trends from 1921 to 1983, takes a closer look at the data from 1984 to 1993, and illustrates the important role played by local governments in the arena of public sector highway financing.

### **Engineering Marvels**

*by Richard F. Weingroff* ..... 28

The Dwight D. Eisenhower System of Interstate and Defense Highways has been called one of the “Seven Wonders of the United States.” This article discusses a few of the extraordinary sections of the system.

### **Atlanta to Showcase ITS Traveler Information**

*by David F. Williams* ..... 35

The Traveler Information Showcase in Atlanta this summer is a \$14 million partnership of federal, state, and local agencies and the private sector to provide the most complex, integrated transportation management and travel information system in the United States.

### **Condition and Performance of the Interstate System — After 40 Years**

*by Clifford M. Comeau* ..... 40

The interstate system has been incredibly successful. Consequently, the reliability of the system and the preservation of its physical assets are key policy and programmatic concerns for the entire transportation community.

### **Road Movies**

*by Richard F. Weingroff* ..... 42

Roads are so much a part of our lives that it is natural that automobiles and highways have played significant roles in hundreds of movies. This is a partial listing of films in which highway travel plays a prominent part.

## **No. 2, Autumn 1996**

### **Eight Steps Toward a “Smarter” National Highway System**

*by Christine M. Johnson* ..... 2

The Federal Highway Administration has already begun to implement these steps to increase the capacity and efficiency of our existing highway systems.

### **Congestion Pricing: Reducing Traffic Jams Through Economics**

<i>by Ginny Finch</i> .....	4
Congestion pricing is a promising concept for reducing gridlock on major highways during peak travel periods and for reducing congestion costs -- wasted fuel, air pollution, and travel delays.	
<b>Performance of Epoxy-Coated Rebars in Bridge Decks</b>	
<i>by Jeffrey L. Smith and Yash Paul Virmani</i> .....	6
Epoxy-coated reinforcing steel provides effective corrosion protection that can extend the service life of concrete bridge decks.	
<b>FHWA Launches New Nationwide Seismic Bridge Design Training</b>	
<i>by James W. Keeley</i> .....	13
“Seismic Bridge Design Applications” is FHWA’s new training course for practicing bridge/geotechnical engineers on “how to” apply the American Association of State Highway and Transportation Officials (AASHTO) seismic analysis and design requirements for different bridge types across the United States.	
<b>Aftermath of the Kobe Earthquake</b>	
<i>by Hamid Ghasemi, Hisanori Otsuka, James D. Cooper, and Hiroyuki Nakajima</i> .....	16
The lessons learned in the aftermath of the Hanshin/Awaji Earthquake in the Kobe, Japan, area on Jan. 17, 1995, have real relevance for the United States. The bridges in central and eastern United States within the seismically active New Madrid Zone are very similar to the types of bridges in the Kobe area, 60 percent of which were damaged by the earthquake.	
<b>WesTrack: The Road to Solutions</b>	
<i>by Terry Mitchell</i> .....	20
WesTrack, a new pavement test track in Nevada, uses four driverless trucks, operating about 20 hours per day, seven days a week, to apply load to its 26 test sections.	
<b>Test Roads: Designing the Pavements of the Future</b>	
<i>by Terry Mitchell</i> .....	23
FHWA and a number of states and other partners are conducting pavement studies, using full-scale test tracks and machines that simulate traffic loads, to gain real-world experience that will result in improved roadway design and construction.	
<b>The Promise of High-Performance Concrete</b>	
<i>by David C. Smith</i> .....	27
The enhanced strength and durability of bridges that incorporate high-performance concrete (HPC) in beams, decks, and piers promise to reduce the lifetime cost and deterioration of these structures. To encourage further research and to promote the use of HPC, FHWA is showcasing HPC in regional events and demonstration projects in the eight states that have become active partners with FHWA by constructing or preparing to construct bridges with HPC.	
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## **The Great River Road Celebrates 60 Years**

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## **Laboratory Testing of the Performance of Moisture-Cured Urethanes on New Steel**

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FHWA has been actively involved in the study of climate-tolerant, durable bridge coatings to ensure extended painting seasons and coating lives.

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FHWA recently tested and evaluated two state-of-the-art prototype nondestructive evaluation systems that, in comparison with theoretical calculations, provide a much more accurate measure of a bridge's load-carrying capacity.

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FHWA examines the national issue of finding cost-effective and customer-sensitive methods to reconstruct freeway pavements.

## **No. 4, January/February 1999**

### **Effects of Partial and Total Sleep Deprivation on Driving Performance**

*by Robert D. Peters, Esther Wagner, Elizabeth Alicandri, Jean E. Fox, Maria L. Thomas, David R. Thorne, Helen C. Sing, and Sharon M. Balwinski*.....2

A study conducted jointly by the Federal Highway Administration's (FHWA's) Human Factors Laboratory and the Walter Reed Army Institute of Research (WRAIR) examined the effects of progressive sleep deprivation on driving performance to assess the rate of crashes and the changes in driving performance resulting from sleepiness.

### **A Silver Bullet: Shoulder Texture Treatments**

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### **It's a Jungle Out There: Using the Bullnose Guardrail to Protect the Elephant Traps**

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FHWA, in conjunction with state departments of transportation, is working to improve guardrail systems. Bullnose guardrails are a safe and effective solution to protecting drivers from falling into the elephant trap of side-by-side bridges.

### **Introducing FHWA's NDE Validation Center**

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### **Traffic-Flow Theory**

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This article outlines the revised *Monograph on Traffic Flow Theory*, an updated and expanded version of two previous works that describe in a precise mathematical way the interactions among vehicles, drivers, and the infrastructure.

## **No. 5, March/April 1999**

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### **Building Roads in Sync with Community Values**

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The challenge to the highway design community is to find design solutions, as well as operational options, that result in the full consideration of increasing public involvement, community and economic development, environmental sensitivity, historic preservation, neighborhood preservation, and concern for bicyclists and pedestrians.

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### **Getting Around in Japan: The Status and Challenges of ITS**

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A new construction concept has resulted in Arizona highways that are 27 percent smoother than their predecessors.

## **Brownfields and Bikeways: Making a Clean Start**

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The Woonasquatucket River Greenway Project in Providence, R.I., is a model of “environmental protection and restoration, economic development, job creation, community revitalization, and public health protection through the assessment, cleanup, and sustainable use of brownfields [lightly to moderately contaminated property].”

## **FHWA's Computer Systems Are Ready for the Year 2000**

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FHWA is on-track in its five-phased approach to ensure that all FHWA computers are Y2K-compatible.

## **“Steps for Action” — Making Sure ITS Is Ready for the Year 2000**

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The U.S. DOT in partnership with 22 transportation associations and professional groups developed the “Steps for Action,” a compilation of information for addressing Y2K problems from the educational, management, technical, and institutional perspectives.

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## **No. 6, May/June 1999**

### **“Doing Futures” C Creating a Preferred Future in Highway Safety**

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The Federal Highway Administration has started a process to identify the actions it must take now and in the future to “create” the future it desires.

### **Improving Safety Through Peer Exchanges**

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National peer exchanges, began in 1994 by the FHWA's Office of Motor Carriers, help to identify the “best practices” related to selected specific elements of the Motor Carrier Safety Assistance Program.

### **National Transportation Week, May 16-22**

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From May 16-22, the transportation community will celebrate National Transportation Week to increase public awareness of transportation and to educate the public about transportation issues.

### **An Immediate Payoff From FHWA's NDE Initiative**

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Advanced nondestructive evaluation and nondestructive flaw-detection technologies played a vital role in the successful emergency structural evaluation of the Cochrane Bridge in Mobile County, Ala.

### **Designing Highways With Older Drivers in Mind**

*by Elizabeth Alicandri, Mark Robinson, and Tim Penney*.....18

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## **FHWA's Driver Performance Laboratory**

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The Driver Performance Laboratory at the Turner-Fairbank Highway Research Center investigates issues of driver performance related to highway and traffic engineering and to the design of in-vehicle information systems.

## **The National Driver History Initiative**

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## **What's a Work Zone?**

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## **The National Work-Zone Safety Information Clearinghouse**

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## **Safety Is Our North Star** ..... 32

The outcomes of the National Transportation Safety Conference, held March 2-3, 1999, are the beginning of a transportation safety action plan and a memorandum of understanding signed by government officials and chiefs of industry, trade, labor, and law enforcement, pledging to make safety a priority in their organizations.

## **1999 International Highway Transportation Safety Week, June 1-5** ..... 37

The aims of the activities of this special week are to promote the message that all drivers are responsible for ensuring safe highways and to educate the public about the efforts to improve truck and bus safety.

## **Human Factors Recommendations for TMC Design**

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## **FHWA's International Geotechnical Engineering Scan**

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In March 1998, a team of geotechnical and structural engineers from FHWA, state highway agencies, and industry went to Canada and Europe to discuss practices for implementing load and resistance factor design methods; to investigate innovative contracting practices; and to identify new or improved mechanically stabilized earth-wall technologies, ground-improvement methods, and in situ testing procedures.

## **Does Asset Management Deserve a Closer Look?**

*by Dena M. Gray-Fisher* ..... 50

The American Association of State Highway and Transportation Officials approved an asset management strategic plan that outlines AASHTO's activities to advance asset management among the organization's members.

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The National Highway Institute (NHI), the external training branch of the Federal Highway Administration, offers a new program to upgrade the skills of its instructors.	

#### **Another Step Toward a Nationally Integrated Traveler Information System**

<i>by R. Dale Thompson</i> .....	5
Traveler information systems have evolved to become sophisticated dissemination devices, which provide travelers with valuable information. FHWA has taken the lead in developing a strategy to guide federal activities and national interest in the development and implementation of a National Traveler Information System.	

#### **Highways and the New Wave of Economic Growth**

<i>by Walter L. Sutton Jr. and David Marks</i> .....	10
Having a seamless intermodal transportation system will determine whether the country will succeed in a "fifth wave" of industrialization. FHWA is doing its part by improving highway infrastructure, the backbone of the nation's intermodal network.	



## **FHWA Fiber-Optics Research Program: Critical Knowledge for Infrastructure Improvement**

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The Las Cruces highway bridge in New Mexico is part of FHWA's research effort that is exploring the use of fiber-optic sensors in highway applications. This research is yielding valuable information about highway construction.

## **Pothole Patchers Demonstrated in California**

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The California Department of Transportation (Caltrans) and FHWA hosted a demonstration that allowed vendors to display their equipment and materials and to introduce new pothole-patching technologies to prospective clients.

## **Managing Car-Crunching Sinkholes**

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The Ohio Department of Transportation initiated an Abandoned Underground Mine Inventory and Risk Assessment process to find out where abandoned mines may exist beneath interstate highways and other roadways. These mines represent an existing, undefined, and yet possibly significant risk to the safety of the traveling public.

## **FHWA Helps Restore Historic Neighborhood in Los Angeles**

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FHWA, Caltrans, the city of Los Angeles, and neighborhood redevelopment agencies joined together to restore some historical ambiance to the Adams-Figueroa Historic District in Los Angeles.

## **The Hoover Dam Bypass**

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Route 93, the roadway leading up to and over the Hoover Dam, which is a National Historic Landmark and one of the world's wonders of civil engineering, is becoming a dangerous bottleneck. Transportation experts examine the options for a high-speed bypass.

## **FHWA Presents the 1999 Environmental Excellence Award Winners** ..... 38

FHWA announced the winners of the 1999 Environmental Excellence Awards on Earth Day (April 22) 1999.

## **Sign Simulator Validated in FHWA Study**

*by Karen R. Mahach, Kathryn Wochinger, Rafael Marshall, and Deanne Eppich* ..... 41

The sign simulator — “signsim” — is used by FHWA to evaluate a group of traffic signs that were proposed as national standards. FHWA researchers discuss the validation process of this simulator.

## **All's Quiet on the Wasatch Front: Technology Keeps Traffic Moving**

*by Melanie Buck* ..... 45

The Utah Department of Transportation has launched CommuterLink, an intelligent transportation system of electronic traffic equipment, computers, and communication systems, to make traveling along the Wasatch Front safer and more efficient.

## **Top 10 Construction Achievements of the 20th Century** ..... 48

An international panel of construction industry executives and editors select the top 10 construction projects of the 20th century.

## **No. 2, September/October 1999**

### **How Transportation Systems Talk to Each Other**

*by David Smallen*..... 2

Intelligent Transportation Systems need national standards to run smoothly. Improved communications linking localities and regions together in a way that results in an improved transportation is the goal of ITS. This requires a system that is interoperable.

## **Gold-Rush Ghost Town Gets a New Alaska Yellow Cedar Bridge**

*by Frank W. Muchmore* ..... 7

Through the Wood in Transportation (WIT) cost-sharing demonstration grant program, the Alaska Department of Transportation and Public Facilities and their partners built a yellow cedar bridge over the Nelson Slough to provide reliable access to Dyea Flats, Alaska.

## **Innovative Traffic Control Practices in Europe**

*by H. Gene Hawkins Jr., W. Scott Wainwright, and Samuel C. Tignor* ..... 10

In May 1998, 10 U.S. traffic engineers traveled to Europe to observe innovative traffic control practices and identify those practices that could be implemented in the United States.

## **Rural Road Safety: a Global Challenge**

*by Patrick Hasson* ..... 16

The Organisation for Economic Co-operation and Development (OECD) created a program to address the safety issues associated with rural roads. Under the Road Transport Research (RTR) Program, national road researchers from OECD member countries exchange and share information. An expert group examined rural road safety problems and made suggestions for possible solutions to lessen the social and economic consequences of rural road crashes.

## **CORBOR Improves Safety, Mobility, and Productivity**

*by Martin Weiss and David Smith* ..... 26

CORBOR — the combination of FHWA's National Corridor Planning and Development Program (NCPD) and Coordinated Border Infrastructure Program (CBI) — provides funding for major national transportation projects. These projects develop the 43 corridors identified by Congress and improve transportation near the borders with Canada or Mexico.

## **Pedaling into the 21st Century**

*by Kenneth R. Wykle* ..... 30

FHWA Administrator Kenneth Wykle discusses the significant role that bicycling plays in the building of liveable communities.

## **Big Bridge, Little Bridge: The Big Dig Soars Across the Charles River**

*by Sybil Hatch* ..... 32

Two new bridges are being built over the Charles River as part of Boston's Central Artery/Tunnel project — the largest, most complex, and technologically challenging highway project attempted in American history. The new bridges will more than double the traffic capacity of the existing I-93 double-decked, steel-truss bridge, built in 1959.

## **Eisenhower Transportation Fellowships: Proving Ground for the New Transportation Professionals**

*by Ilene D. Payne* ..... 36

The Dwight David Eisenhower Transportation Fellowship Program (DDETFP) offers annual full-time opportunities in research, development, and technology transfer projects to students interested in the transportation industry.

## **Value Engineering: An Incredible Return on Investment**

*by Keith Borkenhagen* ..... 39

Value engineering is a multidisciplinary, systematic tool for identifying, analyzing, and solving problems. FHWA is promoting this approach to find new and better ways of doing things. In fiscal year 1998, the return on investment was more than 120 to 1.

## **Managing Resources and Preparing for the Y2K Weekend**

*by John W. McCracken* ..... 44

FHWA is continuing to help transportation operators identify and resolve potential Y2K problems, and FHWA is

also reaching out to help develop contingency plans in the event that Y2K repair efforts fail or that failures are beyond the control of transportation operators.

<b>FHWA's Traffic Research Lab (TReL): Searching for Keys to Unlock the Nation's Gridlock</b> <i>by Juan Morales, Raj Ghaman, and Doug Rekenthaler Jr.</i> .....	47
FHWA's Traffic Research Laboratory (TReL), which is part of the Advanced Traffic Management System (ATMS) Research and Development (R&D) Program, was established as a comprehensive experimental testbed and analysis toolbox to facilitate FHWA's complex, multifaceted R&D program.	

## **No. 3, November/December 1999**

<b>New Technologies Improve Cost-Effectiveness of CMA</b> <i>by W.C. Ormsby</i> .....	2
In an effort to find an efficient, economical, and environmentally acceptable treatment for pavements to remove ice and snow on roadways, FHWA conducted a study, which found that calcium magnesium acetate (CMA) was an excellent alternative deicer to salt. This article discusses CMA and the economics of using CMA instead of salt.	
<b>TFHRC Hosts Collaborative Retroreflective Testing Effort</b> .....	11
To ensure that commercially available retroreflectometers meet the requirements of the state highway agencies, FHWA contracted with HITEC to perform a standard group evaluation of the devices.	
<b>The PAIR Initiative: Repairing and Revitalizing Our Nation's Physical Infrastructure</b> <i>by Richard A. Belle</i> .....	13
The Partnership for the Advancement of Infrastructure and its Renewal (PAIR) aims to put an end to the management-by-crisis approach to infrastructure repair and renewal. PAIR will work with leaders from both the private and public sectors to form collaborative partnerships that bring the best construction technologies and processes to the marketplace.	
<b>FHWA Creates an Office of Asset Management</b> <i>by Madeleine Bloom</i> .....	21
FHWA established the Office of Asset Management on Feb. 1, 1999. FHWA aims to effectively manage transportation systems from a user's perspective and to make integration a major goal of the new office.	
<b>TRB Superpave Committee: Keeping Superpave<sup>TM</sup> Implementation on the Road</b> <i>by Neil F. Hawks</i> .....	23
TRB Superpave Committee works to keep the Superpave program alive and well.	
<b>Knowledge Management: Everyone Benefits by Sharing Information</b> <i>by Mike Burk</i> .....	27
FHWA is taking steps to better manage the collective expertise of its employees and partners. With managed knowledge, information can flow across organizational lines, reach the people who can use it in ways that best promote the FHWA's goals, and enhance service to the customer.	
<b>Are You Ready for Y2K?</b> .....	31
In a report entitled <i>Are You Ready? Managing Transportation Resources Through the Y2K Weekend</i> , which is available on the Internet at <a href="http://www.fhwa.dot.gov/Y2K/y2k.pdf">http://www.fhwa.dot.gov/Y2K/y2k.pdf</a> , FHWA and Public Technology Inc. provide information and suggestions to help governments to prepare for the Y2K weekend and to build public confidence in the adequacy of those preparations.	
<b>FHWA Partners With Brigham Young University to Develop State-of-the-Art Hydraulic Modeling Environment</b> <i>by Larry A. Arneson</i> .....	32
FHWA has partnered with Brigham Young University to explore two-dimensional computer modeling of surface-	

water flows. This modeling provides a level of detail and accuracy not previously available to highway hydraulic engineers.

#### **Highway Finance Information: A Key 21st Century Transportation Decision-Making Tool**

*by Thomas W. Howard* ..... 40

Highway finance data is currently used extensively for a wide range of key efforts, and FHWA plans to make greater use of highway finance data in the future in support of the Department of Transportation's Strategic Plan and in other forward-looking ways.

#### **Condition and Performance of Epoxy-Coated Rebars in Bridge Decks**

*by Ali Akbar Sohahngpurwala and William T. Scannall* ..... 44

FHWA and partners provided funding for a joint research project to evaluate in-service bridge decks constructed with epoxy-coated reinforcing steel. The study examines the long-term performance of epoxy-coated reinforcing steel in concrete bridges and structures exposed to salt.

### **No. 4, January/February 2000**

#### **The Customer-Driven Development of Human Factors Design Guidelines**

*by Christopher A. Monk and Joseph Moyer* ..... 2

The Federal Highway Administration (FHWA) undertook a six-year research program focused on issues related to in-vehicle information displays in order to provide design assistance to advanced in-vehicle systems engineers.

#### **A More Precise Sense of Where We Are**

*by James A. Arnold, Rudy Persaud, and David Smallen* ..... 7

The Nationwide Differential Global Positioning System, which will be operational across the country by 2002, will provide such precise, real-time location information that it will create an ever-increasing number of applications.

#### **The 1999 National Quality Initiative (NQI) Achievement Awards**

*by Donald Tuggle* ..... 14

The National Quality Initiative, a partnership of FHWA and 12 other highway-related organizations, presented its achievement awards to states with highway projects that demonstrate the quality process and results, customer focus, teamwork, innovation and value, and long-term improvement.

#### **DOT Vision for Transportation Research**

*by David Smallen* ..... 19

The Department of Transportation's approach to research emphasizes cooperation, information-sharing, and development of formal research agendas among the agencies within the department and across the federal government. It also promotes partnerships with state and local governments, academia, and the private sector to encourage innovation and accelerate implementation.

#### **Recent Developments in Federal Project Finance**

*by David Seltzer* ..... 26

Recent federal legislation continues the trend of introducing "innovative finance" techniques. Two prominent financing programs that have attracted particular attention are "GARVEE bonds" and "TIFIA."

#### **Western Federal Lands Highway Division Responds to Northwest Emergencies**

*by Edward Hammontree, Richard Barrows, and Brian Allen* ..... 30

The Emergency Relief for Federally Owned Roads Program has been used extensively since 1977 on federal lands, such as national forests, national parks, Bureau of Land Management lands, Indian reservations, and wildlife refuges, for emergency relief from natural disasters or catastrophic failures. But, in March 1996, the Western Federal Lands Highway Division formed a cross-functional team to respond to the large number of requests for assistance.

#### **Pavement Preservation: Preserving Our Investment in Highways**

*by Robert M. Davies and Jim Sorenson*..... 37  
If we take a proactive approach in maintaining our existing highways, we can reduce costly, time-consuming rehabilitation and reconstruction and the associated traffic disruptions — improving mobility, reducing congestion, and providing safer, smoother, longer lasting pavements.

#### **MUTCD — The Millennium Edition**

*by Linda L. Brown* ..... 43  
FHWA is completing the first substantial rewriting of the *Manual on Uniform Traffic Control Devices* in more than 20 years. This manual contains the standards and guidance for the design and use of signs, pavement markings, traffic signals, and other traffic control devices.

#### **Developing NDE Technologies for Infrastructure Assessment**

*by Glenn A. Washer* ..... 44  
This article provides an overview of FHWA’s program for developing nondestructive evaluation technologies for the inspection and evaluation of highway infrastructure.

### **No. 5, March/April 2000**

#### **Developing an “Operations Vision”**

*by Kenneth R. Wykle* ..... 2  
The United States is shifting focus from highway construction to optimizing the performance of the existing highway system by actively managing, maintaining, and operating it in an integrated, intermodal fashion.

#### **Safety Leadership Today for a Safer Tomorrow**

*by Dwight A. Horne* ..... 4  
The Department of Transportation has a clear strategic goal about safety and is structured to implement it.

**National Work Zone Safety Awareness Week — April 3-7** ..... 8  
FHWA, ATSSA, and AASHTO agreed to designate April 3-7 as National Work Zone Safety Awareness Week.

#### **Basics of Concrete Barriers**

*by Charles F. McDevitt*..... 10  
Concrete barriers appear to be simple, but in reality, they are sophisticated safety devices.

#### **A Safe Place to Rest**

*by Maria Koklanaris* ..... 15  
Truckers say that finding an appropriate place to take a much-needed rest is a challenge.

#### **The Quest for Quality: Pennsylvania’s Meyersdale Bypass Project**

*by Robert R. Long Jr.* ..... 19  
The Meyersdale project set a new standard for public-private partnering in Pennsylvania.

#### **Why Asset Management Is More Critically Important Than Ever Before**

*by Anthony R. Kane* ..... 22  
In a time of rapid change, state departments of transportation should be leading the change and thinking of themselves as businesses with billions of dollars of assets.

**Beware of Invasive Species** ..... 25  
Each year, more than \$23 billion nationwide is lost to the effects of invasive plants and animals.

#### **Roadways and the Land: The Landscape Architect’s Role**

*by Elizabeth E. Fischer, Heidi Hohmann, and P. Daniel Marriott* ..... 30  
Landscape architects have been integrally involved in the planning and design of the nation’s highways and

parkways.

### **Critter Crossings**

*by Ginny Finch* ..... 35  
Roads affect animals in several ways, including roadkill, habitat loss, and habitat fragmentation.

### **Hydraulics Testing of Wilson Bridge Designs**

*by J. Sterling Jones* ..... 40  
The designs of the new Wilson Bridge on the National Capital Beltway are tested for scour effects.

### **Wireless Communications: A Modern Necessity**

*by Lester G. Finkle II* ..... 45  
A state wireless communications program using highway rights of way can create a win-win situation.

### **TRANSIMS Is Coming**

*by Kimberly M. Fisher* ..... 49  
TRANSIMS is a series of integrated transportation and air quality analysis and forecasting models.

## **No. 6, May/June 2000**

### **Vol. I, No. 1 — The First Issue of *Public Roads*, May 1918**

*by Richard F. Weingroff* ..... 2  
The first issue gives us a window into the concerns of its time, which are, in some ways, unique to the era, but then again, some things seem to never change.

### **IDAS: A Tool for Integrating ITS Into the Planning Process**

*by Gene McHale* ..... 11  
IDAS is designed to pick up where the traditional four-step planning models end.

### **Turbo Architecture: A Tool for Leveraging the National ITS Architecture**

*by the National ITS Architecture Team* ..... 14  
Turbo Architecture is a software tool that makes it significantly easier to build ITS architectures using the National ITS Architecture as a reference.

### **Communities of Practice**

*by Mike Burk* ..... 18  
Communities of practice are networks that identify issues, share approaches, and make the results available to others.

### **Middle School Students Design Future Cities** ..... 22

During National Engineers Week, student teams were recognized for their creativity in designing cities of the future.

### **The Partnership Initiative: A Unified Agenda for Highway Research and Technology**

*by Michael Halladay* ..... 23  
The goal is a national R&T agenda and the outlining of appropriate roles of all participants in a robust R&T program.

### **Vermont Rest Area Uses Green Wastewater Treatment System**

*by Molly Farrell, Liz Van der Hoven, and Tedann Olsen* ..... 27  
Vermont installed a modular sewage-to-reuse system to recycle wastewater back into the restrooms of a rest area to flush toilets.

### **The Federal Transportation Livability Initiative — Building Livable Communities for the 21st Century**

*by Elizabeth E. Fischer* ..... 30

Livable communities adhere to “smart growth” practices to ensure a better quality of life and strong, sustainable economic growth.

### **An Australian Road Review**

*by Bonnie L. Harper-Lore* .....35

FHWA’s roadside vegetation specialist gets a firsthand view of the Australian perspective of vegetation management.

### **Advantages of the Split Intersection**

*by Joe G. Bared and Evangelos I. Kaiser*.....38

By separating the opposing directions of traffic, the split intersection facilitates smoother traffic flows with less delay.

### **One Mile in Five: Debunking the Myth**

*by Richard F. Weingroff*.....45

It is not true that one mile in five on the Interstate Highway System must be straight to serve as an emergency airstrip.

**National Transportation Week, May 14-20**.....47

A number of activities are planned to focus attention on the role of transportation in the United States.

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### No. 1, July/August 2000

#### National Research Projects on Recycling in Highway Construction

by Marcia J. Simon, Warren H. Chesner, Taylor Eighmy, and Howard Jongedyk .....2

The Federal Highway Administration and the National Cooperative Highway Research Program have sponsored



several research projects — some ongoing and others recently completed — pertaining to the use of recycled materials in highway construction.

### **The Recycled Materials Resource Center**

*by Bryan J. Magee* ..... 11

This national center was established in 1998 at the University of New Hampshire to promote the appropriate use of recycled materials in the highway environment. RMRC will conduct about 30 research projects over the first six years of operation.

### **Lessons Learned: TxDOT's Efforts to Increase the Use of Recycled Materials**

*by Rebecca Davio* ..... 16

The Texas Department of Transportation shares lessons learned from five years of experience with a recycled materials program.

### **How NCDOT Is Building a Recycling Culture**

*by Ashley T. Memory* ..... 24

The N.C. Department of Transportation is demonstrating the cultural benefits of recycling to encourage local participation.

### **National Transportation Week: Sounding Reveille for Transportation**

*by Conni Morse* ..... 28

Transportation Secretary Rodney E. Slater and three former secretaries of transportation kicked off a successful National Transportation Week, May 14 through 20, 2000.

### **Geosynthetic Reinforced Soil Structures Can Carry the Load**

*by Maria Koklanaris* ..... 30

FHWA's Geotechnical Research Team demonstrates the prodigious load-bearing capacity of geosynthetic reinforced soil.

### **Scanning European Advances in the Use of Recycled Materials in Highway Construction**

*by Katherine Holtz and T. Taylor Eighmy* ..... 34

In September 1999, a team of U.S. engineers went to several countries in Europe to see how the Europeans achieve such a remarkable recycling rate — frequently reaching 100 percent — in the highway environment.

### **Managing Change in FHWA**

*by Peter C. Markle* ..... 41

FHWA's program manager for change management lays out his plan to assist in the continuing transition to a new organizational structure and to evaluate the effectiveness of the restructured organization.

### **Highways and Bridges on the Brink of the New Century**

*by Clifford Comeau and David Smallen* ..... 43

The 1999 *Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance* report to Congress shows that the higher federal highway funding levels of the past few years have begun to pay off with better pavement, improved bridges, and safer highways.

### **The National IVI Meeting** ..... 48

On July 18 and 19, representatives of federal, state, and local governments; industry; and universities will meet in Washington, D.C., to discuss intelligent vehicle initiative (IVI) technologies and plans for the future.

## **No. 2, September/October 2000**

### **The Genie in the Bottle: The Interstate System and Urban Problems, 1939-1957**

*by Richard F. Weingroff* ..... 2

Because of its sheer size and scale, the Interstate Highway System became controversial as soon as the construction program began, and its impacts, particularly on our cities, remain controversial.

### **LANI and the Leimert Park Project**

*by Kathleen A. Bergeron* ..... 16

The Leimert Park Project in Los Angeles is a model program for using transportation to help revitalize communities.

### **Enhancing Pavement Smoothness**

*by Mark Swanlund* ..... 20

A survey of highway users revealed that pavement smoothness is the user's most desired highway "product" and smooth pavement also makes economic sense. So, FHWA's task is clear — to work with states and others to improve pavement smoothness.

### **Surviving the Turbulence: the Transportation-Air Quality Arena, 1999-2000**

*by Michael Koontz* ..... 23

The conformity process wields considerable control over many transportation plans and programs. Recent legal proceedings and other developments that add to this dynamic process have taken hold from the transportation and technology side.

### **Strategic Plan for Transportation and Air Quality Research, 2000-2010**

*by Mike Savonis* ..... 29

The relationship between transportation and air quality is complex and will challenge researchers well into the future.

### **Atlanta "Conforms" to Clean Air Requirements**

*by James M. Shrouds* ..... 35

For more than two years, Atlanta's ability to use federal transportation funds for transit and highways was severely limited. However, in the last year, Atlanta has made a major turnabout in its transportation and air quality planning.

### **Measuring Economic Impacts of Federal-Aid Highway Projects**

*by William P. Anderson and Arthur C. Jacoby* ..... 37

A study is underway by FHWA and the Boston University Center for Transportation Studies to quantitatively assess the direct, indirect, and induced economic effects of several categories of highway improvement projects.

### **Transportation in the 21st Century**

*by Robert E. Skinner Jr.* ..... 42

The executive director of the Transportation Research Board presents a broad view of transportation and change, discusses some important trends and characteristics of transportation that will influence its evolution in the United States, and comments on specific proposals that have been advanced for transportation.

## **No. 3, November/December 2000**

### **Using Monte Carlo Simulation for Pavement Cost Analysis**

*by Keith D. Herbold* ..... 2

The Federal Highway Administration (FHWA) developed a model and made arrangements with 10 states and two pavement associations to prepare case studies illustrating the application of risk analysis to life-cycle cost analysis in pavement design. The studies show that with limited training in probabilistic principles and in the application of risk-analysis software, state highway agency personnel can apply the probabilistic approach to their current life-cycle cost-analysis procedures.

### **ITS Peer-to-Peer Program**

*by James Pol* ..... 7

This program provides free technical assistance to agencies seeking to improve transportation operations through the deployment of intelligent transportation systems.

## **Design Evaluation and Model of Attention Demand (DEMA<sub>ND</sub>): A Tool for In-Vehicle Information System Designers**

*by Christopher A. Monk, M. Joseph Moyer, Jonathan M. Hankey, Thomas A. Dingus, Richard J. Hanowski, and Walter W. Wierwille*..... 10

FHWA developed a behavioral model that predicts the performance of drivers interacting with an in-vehicle information system (IVIS) and a prototype software package that uses the behavioral model to evaluate the attention demanded to operate a given IVIS.

## **Studying the Reliability of Bridge Inspection**

*by Brent M. Phares, Dennis D. Rolander, Benjamin A. Graybeal, and Glenn A. Washer* ..... 15

FHWA's Nondestructive Evaluation Validation Center initiated a comprehensive study to determine the reliability of visual inspection of highway bridges. The general objective was to provide an overall measure of the reliability and accuracy of routine and in-depth inspections and to study the influence of human and environmental factors on inspection reliability.

## **Ultrasonic Inspection of Bridge Hanger Pins**

*by Benjamin A. Graybeal, R.A. Walther, Glenn A. Washer, and Amy M. Waters* ..... 20

FHWA's Nondestructive Evaluation Validation Center conducted a study to determine the reliability of contact ultrasonic techniques in the field to accurately locate defects in hanger pins.

## **The Northwest Transportation Technology Exposition**

*by Catherine Nicholas and Clayton Wilcox*..... 27

State and local transportation maintenance and engineering specialists from throughout the Pacific Northwest attended a technology exposition in September 2000 at Moses Lake, Wash., to observe new technologies and equipment in action.

## **Faster, Easier, Cheaper — Pyrotechnical Anchoring**

*by David Smallen*..... 32

A French machine, using firecracker-type explosives ignited by a gas generator, shoots anchoring piles into the ground at 644 kilometers (400 miles) per hour.

## **Practical Research Answers Real-Life Questions**

*by Sybil Hatch*..... 36

Two concurrent research programs funded by FHWA, ADSC, and others are being conducted to study anomalies in drilled shaft construction.

## **A Nondestructive Impulse Radar Tomography Imaging System for Timber Structures**

*by Jose E. Hernandez and Sheila Rimal Duwadi* ..... 39

The micropower impulse radar technology developed at the Lawrence Livermore National Laboratory shows good potential for the nondestructive inspection of timber structures because of its small size and low power consumption and because its imaging capability is expected to accurately show the extent and location of problem areas and to produce data that can be more easily interpreted than conventional ground-penetrating radar data.

## **Strategic Work-Zone Analysis Tools**

*by John Harding*. .... 44

The SWAT program addresses work-zone factors and stresses the importance of accounting for work-zone influences when making transportation-improvement decisions.